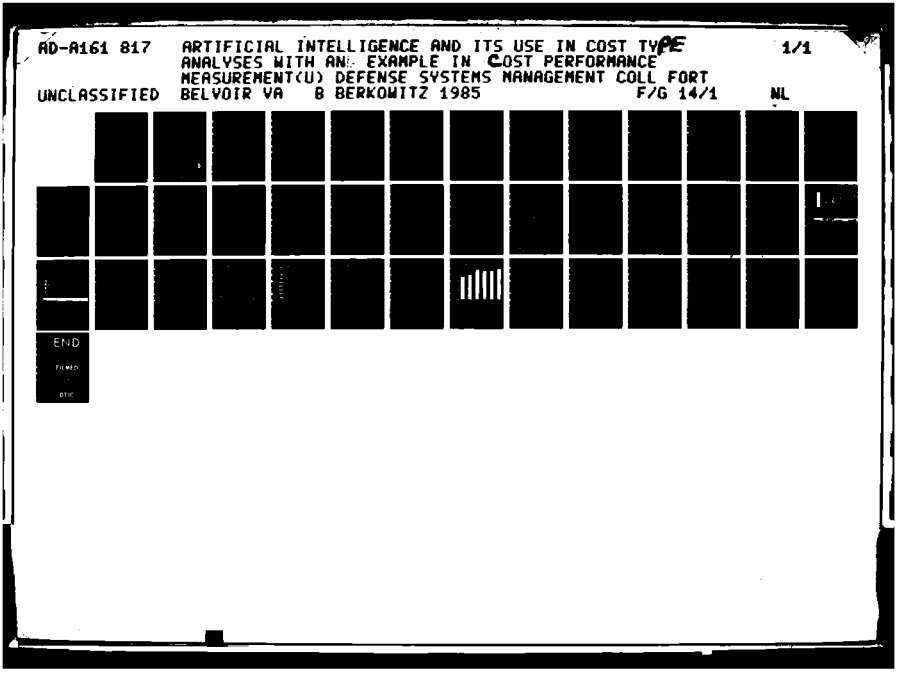
AD-A161 817 ARTIFICIAL INTELLIGENCE AND ITS USE IN COST TYPE
ANALYSES WITH AN EXAMPLE IN COST PERFORMANCE
MEASUREMENT(U) DEFENSE SYSTEMS MANAGEMENT COLL FORT
UNCLASSIFIED BELVOIR VA B BERKOWITZ 1985 F/G 14/1
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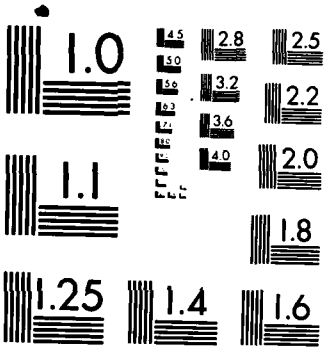

Artifical Intelligence And Its Use In Cost Type Analyses With An Example In Cost Performance Measurement

by

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Defense Systems Management College

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Xerox Training Center

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INTRODUCTION

Computer use by analysts is extensive to say the least, however, full use/utilization is far from the norm. With the application of USER FRIENDLY analysis packages (application software), it is assumed that the analyst can be more effective and begin to utilize the potential of the hardware available to most operations. User friendly, unfortunately, has many different meanings to many different people. Even if a piece of software is considered user friendly, by the user, it still may not allow for the most cost effective use of the analyst's time, or for that matter of his expertise. Let me offer a definition of "user friendly", to establish a reference point which we can talk to within this paper:

> User Friendly Software: Software which requires the minimum of user knowlege to operate, that yields a useful product, and reduces the users expenditure of resources to accomplish a given task.

The above definition only relates to the usefullness of a software package and doesn't discuss the ultimate effectiveness of the tool. Obviously, improving the man/machine/software interface, by making the system more user friendly (reference the above definition), will improve the effectiveness of the user.

Lets, however, first address the usefullness aspect and later talk about how we can improve, even more, the overall effectiveness of the total system (man/machine/software).

Each one of us has our own real (and perceived) effectiveness level. This effectiveness level (capability plane) is determined by our inate ability and aquired technical skills. Additionally, we boost our capability level through the addition of special tools, such as, the hand held calculator, personal computer and associated software (programs). With the addition of each newly aquired tool, we reach a higher effectiveness plane. Many more people became fuctionaly literate with much less inate ability and skill with the advent of the scientific hand held calculator. For example, prior to the hand held calculator, many cost analysts relied on the use of graph paper for estimate solutions, since the mathematical approach was considered to tedious or difficult. The calculator alone can not take all the credit, however, since we, have become more technically competent over the years, since learning curve theory was first postulated in the aviation industry. The fact still remains, however, that the tools, recently made available have greatly advanced the analyst's ability.

ARTIFICAL INTELLIGENCE-THE EMERGING TECHNOLOGY

NATURAL LANGUAGE PROCESSORS

With the advent of ARTIFICAL INTELLEGENCE (AI), we are entering into a new era of man/machine/software combined effectiveness. AI offers us, not only, user friendly application packages and interfaces, but a major boost in our effectiveness planes. The user friendliness is one aspect of AI, but there are other elements that make this technology a major extension of the human mind. This paper will explore just two applications and their use in the analysis world.

The first aspect ~~we will~~ examined is: user friendliness. To really understand why I made the statement that we are now on the verge of a significant new effectiveness plane, we must explain what AI is about. The name implies; simulation of human intelligence. The computer is simulating human intelligence. Since the computer is not a human, its intelligence is artifical. The major difference between a standard computer and one using AI is that AI maps/simulate human cognitive structure. In other words, the computer appears to be thinking like a human. Standand computers (operating with some piece of application software) only do what we tell them to do. They do not think. With AI, the computer appears to actually think, even though it really isn't. AI software operates on human supplied decision

rules, it can manipulate these rules, through the cognitive map. Natural common sense is not available, however, reasoning sense through the decison rule manipulation is present.

With this human congnitive mapping, one thing that falls out is the ability to create software which understands human language. These human language understanding machines/software packages are known as NATURAL LANGUAGE PROCESSORS. This means that an analyst (anyone for that matter) can communicate with a computer using their own language. The implications of the natural language processor should be obvious. An analyst does not have to have extensive training prior to becoming fuctionally literate, or for that matter totally effective with a software package.

The ability exists to take current analysis packages and wrap a natural language processor around them, making the man/machine/software interface USER FRIENDLY. One such natural language processor which is commerically available is INTELLECT, by Artifical Intellegence Incorporated, Waltham, Mass.

To illustrate what a natural language processor interface might do, lets assume you needed all the elements in your contractor cost performance report data base (CPR) that had a cumulative cost variance greater than 10% at level three. A typical command would be:

I need to know all the level three items that have a cum cost variance greater than 10%.

With a natural language processor, the above command would provide the required results from the data base. The effectiveness improvement should be apparent. Especially, when you realize that the system is converting the plain English request into the data base command structure, without the user having to know the data base command language structure. A sample session using INTELLECT with a Cost Performance Report (CPR) database is contained in appendix A.

The Office of the Secretary of Defense, in Program Analysis and Evaluation (OD/PA&E), is finalizing the development of a natural language processor based data base system for Contractor Cost Data Reporting System (CCDR) information. This system will enable analysts to access the CCDR data base using plain English. Additionally, they will be able to accomplish mathematical manipulations and sorts of the data elements as well as statistical analysis of the resultant data set, all using plain English commands.

Both of above mentioned systems enable the analyst, with the least amount of training, to become extremely powerful users of both analytical tools and data base systems.

EXPERT SYSTEMS

The other aspect of AI that we will discuss is that of the EXPERT SYSTEM. An expert system is one that simulates (maps) the analyst's cognitive structure in the accomplishment of some analysis. As described in the background section of this paper, this mapping is a set of decision rules by which the expert accomplishes their analysis.

To date, very succsessful attempts at developing expert systems have been accomplished. One the earliest was in the area of geological exploration for oil. A geological organization, specializing in oil exploration, gathered a group of experts together and mapped their thought processes in the exploration/testing for oil. The result was the ability to send a small field team with an AI computer loaded with the expert system on oil explorations. This small field team, with minimal expert support was able to operate with the same effect as having a team of experts. The cost effectiveness benefits of this type of expert system should be apparent.

In the area of medicine, there has been a major inroad in the area of expert systems. One example is an aided diagnosis expert system that has been inplace for some time. Even though the system can not make totally reliable diagnoses in all case, but then again either can human doctors, it does aid doctors in their

diagnosis. With the sensitivity of human life implications, the expert systems approach has meet with extreme caution, if not with very strong oppostion. Medicine is far from an exact science, and attempts at mapping the human doctor's diagnoses thought process for all possable diseases is probably the major stumbling block in achieving the perfect expert system. That assumes, of course that perfection is achievable. In any event the experiments have had tremendous impact in the area, and additional systems are being developed in this area.

A more recent application, in the area of contractor cost performance evaluation, was developed by the Defense Systems Management College, at Ft. Belvior, Viginia, under contract with Doty Associates of Rockville, Maryland. This system, currently known as the Contractor Appraisal System (CAPPS), operates on micro computers under the MS-DOS operating system. The purpose of the system is to enable program manager level personel to very quickly appraise contractor performance based on Contractor Performance Report (CPR) data.

CAPPS' power comes not only from the expert system application, but also from the fact that it operates on small micro computers. In the past, the expert systems operated only on large main frames or on special AI comperters. The special AI computers, even though they have been coming down in cost, are very expensesive. The ability to access CAPPS on an IBM PC or compatiable, along with the Air Force standard micro, the Z-100,

enables a very large population access to its power.

Even though CAPPS doesn't utilize a natural language processor, its architecture is such that only two keys enable full use of the system (the return key and the space bar). Appendix B contains a sample of CAPPS output, both verbal and graphical.

CAPPS has been demonstrated at the College to groups of progam managers and analysts, as well as used in the Program Managers Workshop and the Contractor Performance Management Course since May of this year (1985). The system has been received with tremendous enthusiasm. The capability enhancement to the program manager and analyst alike has been recognized by these observers just from this small introduction. The demand for copies of the software has been overwhelming, and its use has begun in the field.

One aspect of AI, however, which has not been explored yet, has to do with the educational capabilities of the system. At DSMC, the system has been used to deepen the and broaden the students understanding of CPR use and analysis. There is no reason why the same effect can not be achived at the comptroller level and or at the program office with their own training programs.

The current release of CAPPS is a single expert system. In other words, there is only one expert's cognitive CPR analysis

process mapped within the system. DSMC plans to futher develop this system by gathering a group of experts to refine/expand the expert base.

From the tests to date, and actual applications, it has been proven that AI really dosen't replace the expert, but truly enhances them. We may, at some future time, develop truly replacement capability, however, current technology requires human intervention at some point.

THE BOTTOM LINE-SUMMARY

The bottom line, is that through the use of AI, we offer the analytical world the capability of jumping more than one capability plane. natural language processors and expert systems provide us with the tools to truly make dramatic leaps in the accomplishment of accurate, timely, logical, defendable analyses. Artifical intelligence is offering us the same benefits that are associated with a major technology breakthrough. Even the expert can now take advantage of other experts by simply turning on their personal micro computer. Cost estimating, independent analyses, cost tracking and control techiques are definate candidates for this technology. Many errors associated with human data manipulation and analysis should be able to be reduced significantly with each new step into the AI world. The manager can become even more powerful by utilizing his/her own set of electronic experts at any time, identifing problem

areas/questions in almost real time.

The future is starting now. We need to consider this technology in every new tool developement as well as in the upgrading of current systems. The implications are too great to let our option lapse without taking a good look at what we can achieve. AI technology is well within our grasps and extremly affordable.

APPENDIX A

INTELLECT EXAMPLE WITH CPR DATA

ARTIFICIAL INTELLIGENCE CORPORATION: INTELLECT 300.0 SEPTEMBER [illegible]
GOOD EVENING

THIS IS ARTIFICIAL INTELLIGENCE CORPORATION'S
INTELLECT QUERY SYSTEM

DEPARTMENT OF DEFENSE
DEFENSE SYSTEMS MANAGEMENT COLLEGE

USE OF CONTRACTOR
PERFORMANCE
MEASUREMENT DATA

Please enter your first request.

1:Help 15:New Request 16:Lex Editor

INTELLECT READY

[illegible]

[illegible] Intelligent Corporation: INTELLECT SOZA SEPTEMBER 17, 1985 6:04PM
LIST EXPENDITURE FOR PROJECT 10010 FOR AUGUST
PRINT THE TOTAL CUMULATIVE BUDGETED COST OF WORK SCHEDULED, CUMULATIVE
BUDGETED COST OF WORK PERFORMED, CUMULATIVE ACTUAL COST OF WORK PERFORMED,
VARIANCE (BCWP-BCWS), CURRENT REVISED ESTIMATE, MANAGEMENT RESERVE, CURRENT
BUDGETED COST OF WORK SCHEDULED, CURRENT BUDGETED COST OF WORK PERFORMED,
CURRENT ACTUAL COST OF WORK PERFORMED AND MANAGEMENT RESERVE APPLIED OF ALL
PRODUCT CODES WITH BUDGET > 20000.

[illegible] 14:Save Request 15:New Request 16:Lex Editor

End of page READ

[illegible] Processing

[illegible] Intelligent Corporation: INTELLECT SOZA SEPTEMBER 17, 1985 6:04PM

[illegible] Report
[illegible] BUDGETED COST OF WORK SCHEDULED: $12,201
[illegible] BUDGETED COST OF WORK PERFORMED: $11,976
[illegible] ACTUAL COST OF WORK PERFORMED: $11,989
[illegible] ESTIMATE: $12,000
[illegible] ESTIMATE: $12,000
[illegible] RESERVE: $11,000
[illegible] BUDGETED COST OF WORK SCHEDULED: $12,201
[illegible] BUDGETED COST OF WORK PERFORMED: $11,976
[illegible] ACTUAL COST OF WORK PERFORMED: $11,989
[illegible] RESERVE APPLIED: $0
End of report

[illegible] [illegible] 14:Save Request 15:New Request 16:Lex Editor

End of page READ

[illegible] Processing

ARTIFICIAL INTELLIGENCE CORPORATION: INTELLECT 302A SEPTEMBER 17, 1985 6:06PM
SHOW ME A RANKED COMPARISON OF COST VARIANCE BY MONTH
PRINT A RANKED COMPARISON OF THE TOTAL COST VARIANCE IN EACH MONTH OF THE PROJECT COSTS.

MONTH	COST VARIANCE	PERCENT
JUN84	$6,043	22.5%
MAY84	$5,352-	17.05
APR84	$4,955-	18.38
MAR84	$4,217-	15.64
FEB84	$3,466-	12.86
JAN85	$1,715	6.36
DEC83	$975	3.61
NOV83	$189-	0.70
OCT83	$71-	0.26
SEP83	$7-	0.03-

1:Edit 14:Save Request 15:New Request 16:Lex Editor

End of page READ

Planned

ARTIFICIAL INTELLIGENCE CORPORATION: INTELLECT 302A SEPTEMBER 17, 1985 6:06PM

MONTH	COST VARIANCE	PERCENT
SEP83	$45	0.17-
OVERALL	$26,957-	100.00

Next command:

1:Edit 14:Save Request 15:New Request 16:Lex Editor

End of page READ

Planned

[illegible] INTELLIGENCE CONFIGURATION: INTELLECT SOLVE SEPTEMBER 17, 1985 [illegible]
SELECT PROMPTER HAS THE REQUEST COST VARIABLE
CLICK THE QUESTION MARKER ABOVE COST VARIABLE OR ANY REQUEST COSTS.

[illegible]	COST [illegible]
[illegible]	$45

[illegible] Requests:

1:Help 14:Data Request 15:New Request 16:Exit Editor

INTELLECT READY

[illegible] Proceed

```
ARTIFICIAL INTELLIGENCE CORPORATION: INTELLECT 302A    SEPTEMBER 17, 1985 6:52PM
LET ME SEE THE COST PERFORMANCE INDEX
YOUR REQUEST IS AMBIGUOUS TO ME. DO YOU WANT TO PRINT:

 1) MONTH AND CUMULATIVE COST PERFORMANCE INDEX

 2) MONTH AND CURRENT COST PERFORMANCE INDEX
.
Please enter the number of the interpretation you intended:

_
```

```
F5:Help            F14:Old Request   F15:New Request   F16:Lex Editor

                                                                 INTELLECT READ
 # 1      Proceed

ARTIFICIAL INTELLIGENCE CORPORATION: INTELLECT 302A    SEPTEMBER 17, 1985 6:52PM
LET ME SEE THE COST PERFORMANCE INDEX.
PRINT THE MONTH AND CUMULATIVE COST PERFORMANCE INDEX OF ALL PROJECT COSTS.
```

MONTH	CUM CPI
AUG85	1.001
SEP85	1.002
OCT85	0.998
NOV85	0.996
DEC85	0.984
JAN86	0.977
FEB86	0.962
MAR86	0.961
APR86	0.961
MAY86	0.962
JUN86	0.96[illegible]

```
Next request?

F5:Help            F14:Old Request   F15:New Request   F16:Lex Editor

                                                                 INTELLECT READ
 #
```

ARTIFICIAL INTELLIGENCE CORPORATION INTELLECT 300A SEPTEMBER 1, 1985 2:51PM
Next request: LET ME SEE THE COST VARIANCE REPORT

F1=Help F4=Old Request F6=New Request F10=Editor

INTELLECT READY

____

ARTIFICIAL INTELLIGENCE CORPORATION INTELLECT 300A SEPTEMBER 1, 1985 2:55PM

PREPARED ON 09/12/1985 AT 10:01:58 PAGE 1

COST VARIANCE REPORT

MONTH	CUMULATIVE BCWP	CUMULATIVE ACWP	COST VARIANCE
[illegible]	$11,925	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

APPENDIX B

CAPPS EXAMPLE OUTPUT (EXPERT SYSTEM)

W E L C O M E

T O

C A P P s

The CONTRACT APPRAISAL SYSTEM

This system provides management-level interpretations of contract performance information reported to you via Cost Performance or Cost/Schedule Status Reports. The system analyzes trends in the data and identifies potential problem areas where further discussions with your analysts or contractor are recommended. The system was not intended to replace your analysts, but rather to aid your communication with them and your contractor.

For assistance or additional information, contact:

Defense Systems Management College
Program Manager's Support System Directorate
Fort Belvoir, Virginia 22060-5426
AV 354-4795/5783 or Commercial (703)664-4795/5783

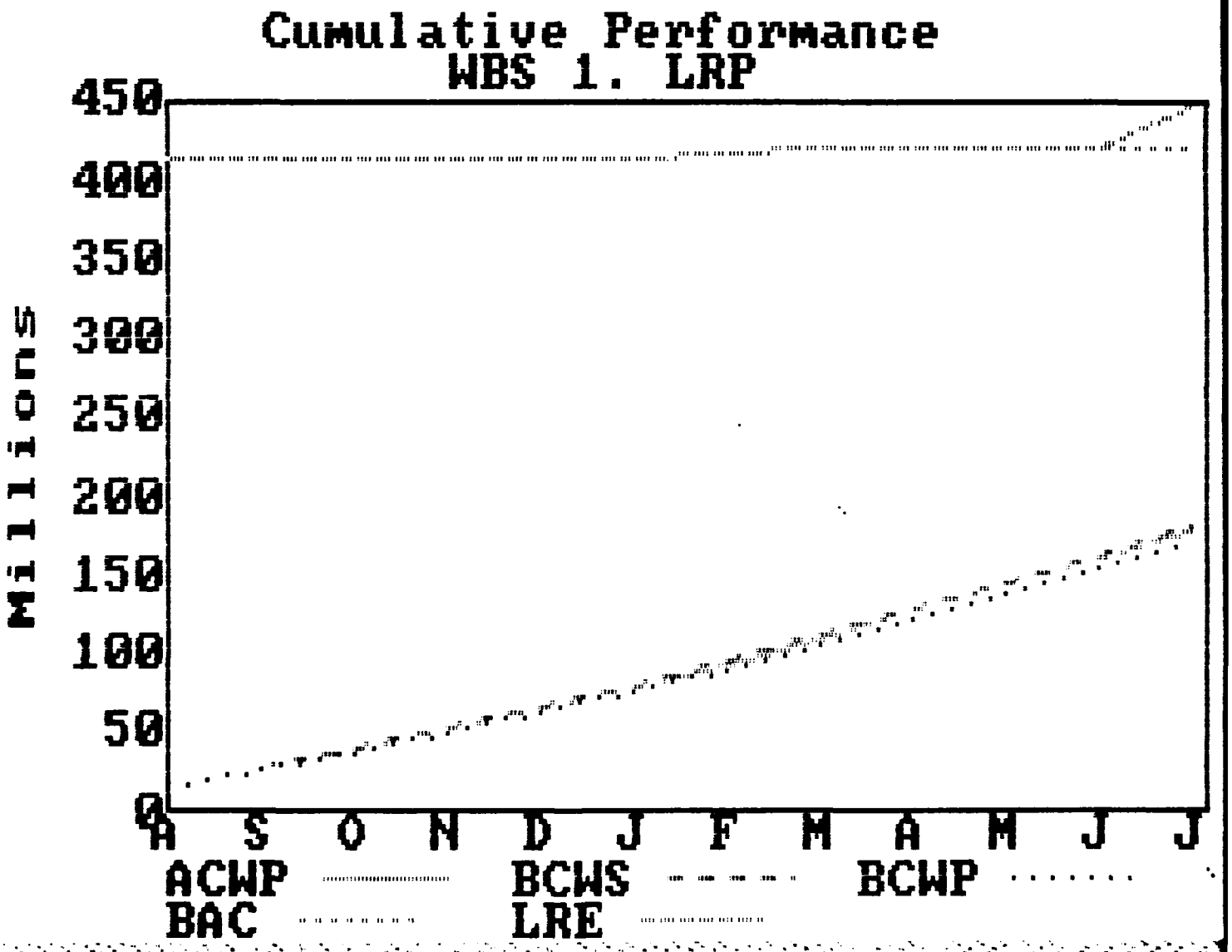
Press the RETURN key to continue

Status of Element 1. - LRP

** COST **	** SCHEDULE **
Monthly actuals are running at $17812K. This effort has an unfavorable cost variance of 4 percent. For what it's worth, overall performance is holding relatively steady.	The contractor says this effort is about 40 percent complete. Work in process is behind schedule.

** PROJECTED **

[Key_Elements] Cum_Performance All_Elements Overview Explain Quit



CUMULATIVE PERFORMANCE GRAPH

This graph displays the overall status of the element and is probably the single most useful portrayal of performance data available.

The dash-dot line (yellow) represents the baseline PLAN from which status is measured. If everything were right on cost and right on schedule, this is how things would look.

The dash line (blue) represents the status of work performed. When it is below the dash-dot line, LESS work has been performed than expected.

The solid red line represents the expenditures.

Normally, you would expect all three lines to be relatively equal, so if you are having a hard time distinguishing them, BE GRATEFUL, things are probably okay. When you start to see the solid line go up sharply, take note, cost growth may be in the future.

[RETURN] PREVIOUS_SCREEN HELP
definitions

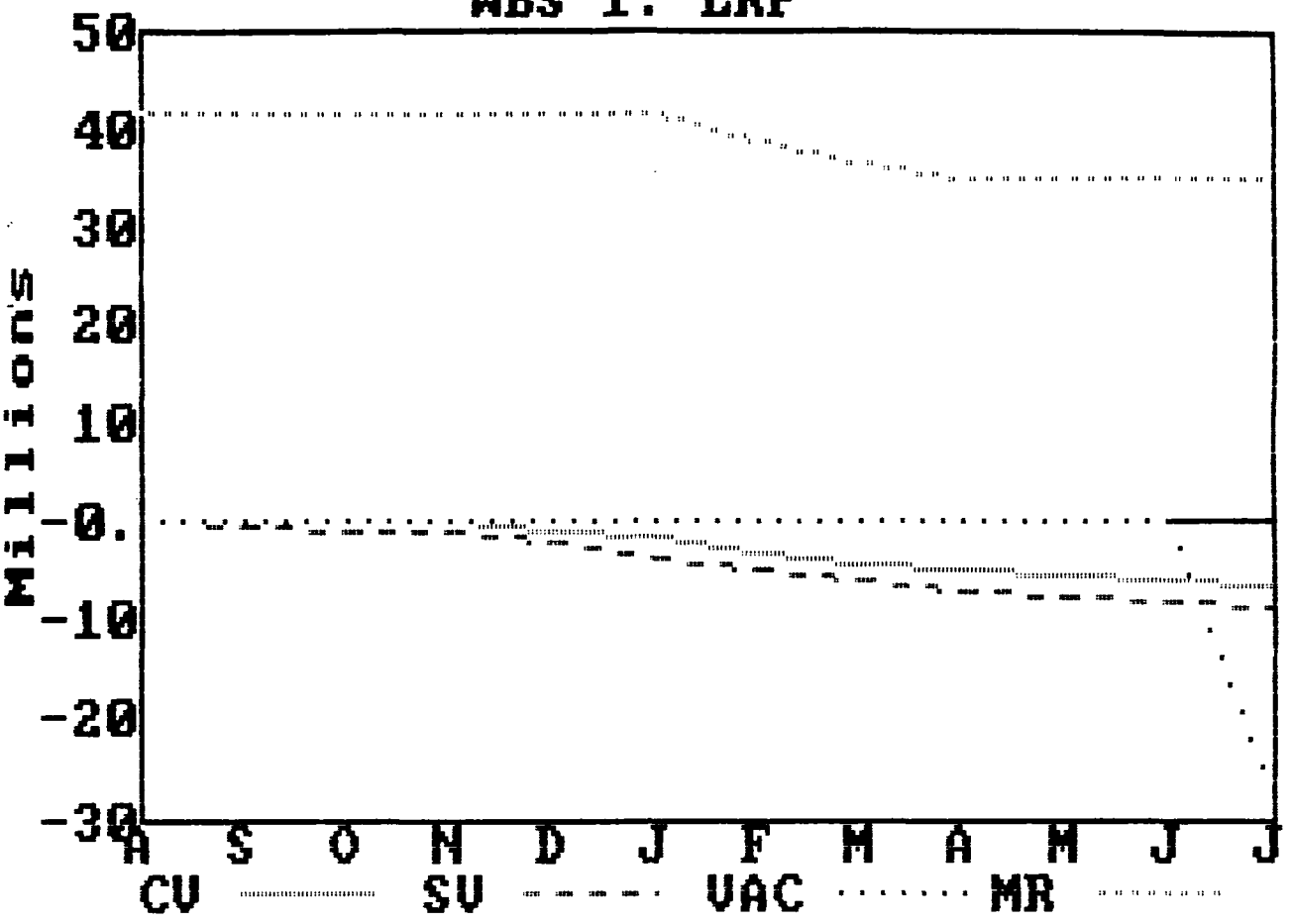
MAIN HELP MENU
==========

Welcome to the Help system.

The following topics are available in this HELP system. You select a topic by hitting the space bar until the topic you want is highlighted in the menu selection at the bottom of the screen and then pressing the return (or enter) key.

STRUCTURE	Discusses the basic structure of CAPPs	HARDCOPY	Explains how to get a hardcopy output
FLOW	Explains how CAPPs operates	GRAPHICS	Discusses CAPPs Graphics
KEYPAD	Discusses how CAPPs uses the keypad	DEFINITIONS	Explains some basic data elements used in CAPPs
FILES	Lists the required CAPPs files	?	Explains help

[RETURN] PREVIOUS_SCREEN HELP
Structure Flow Keypad Files *Hardcopy* *Graphics* *definitions* ?



VARIANCE TRENDS

This plot highlights performance trends -- if there are any. The cost variance is shown with a solid red line, the schedule variance is shown with a dashed blue line, and the variance at completion is shown with a dot yellow line.

Performance which is above the zero line is favorable (either ahead of schedule or under cost). When performance is below the line, the opposite is true.

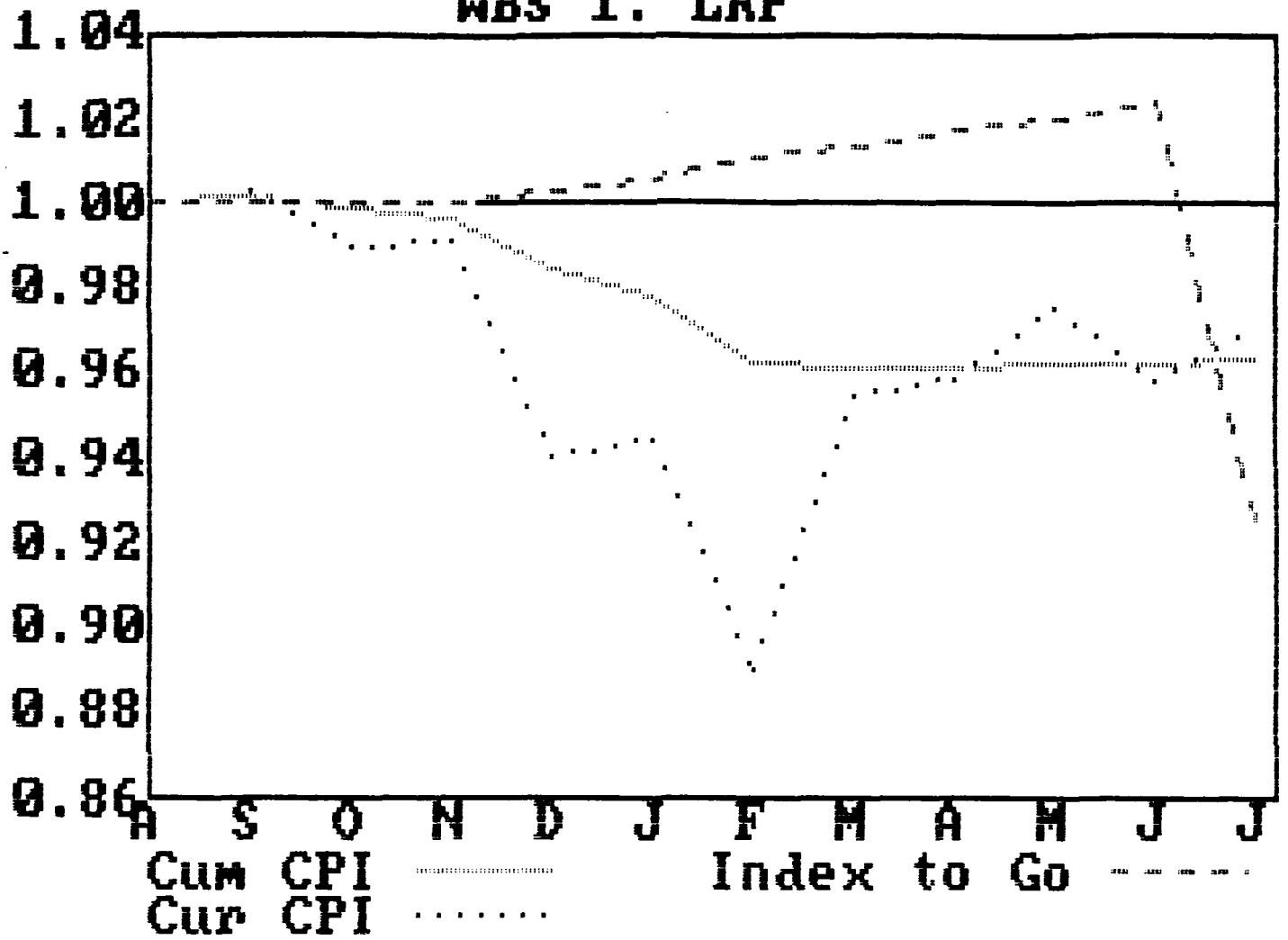
The trick is to watch for

1. Sudden changes in the direction of either of the lines,
2. Unfavorable trends (downward) in the cost variance line, or
3. Early unfavorable schedule variance trends.

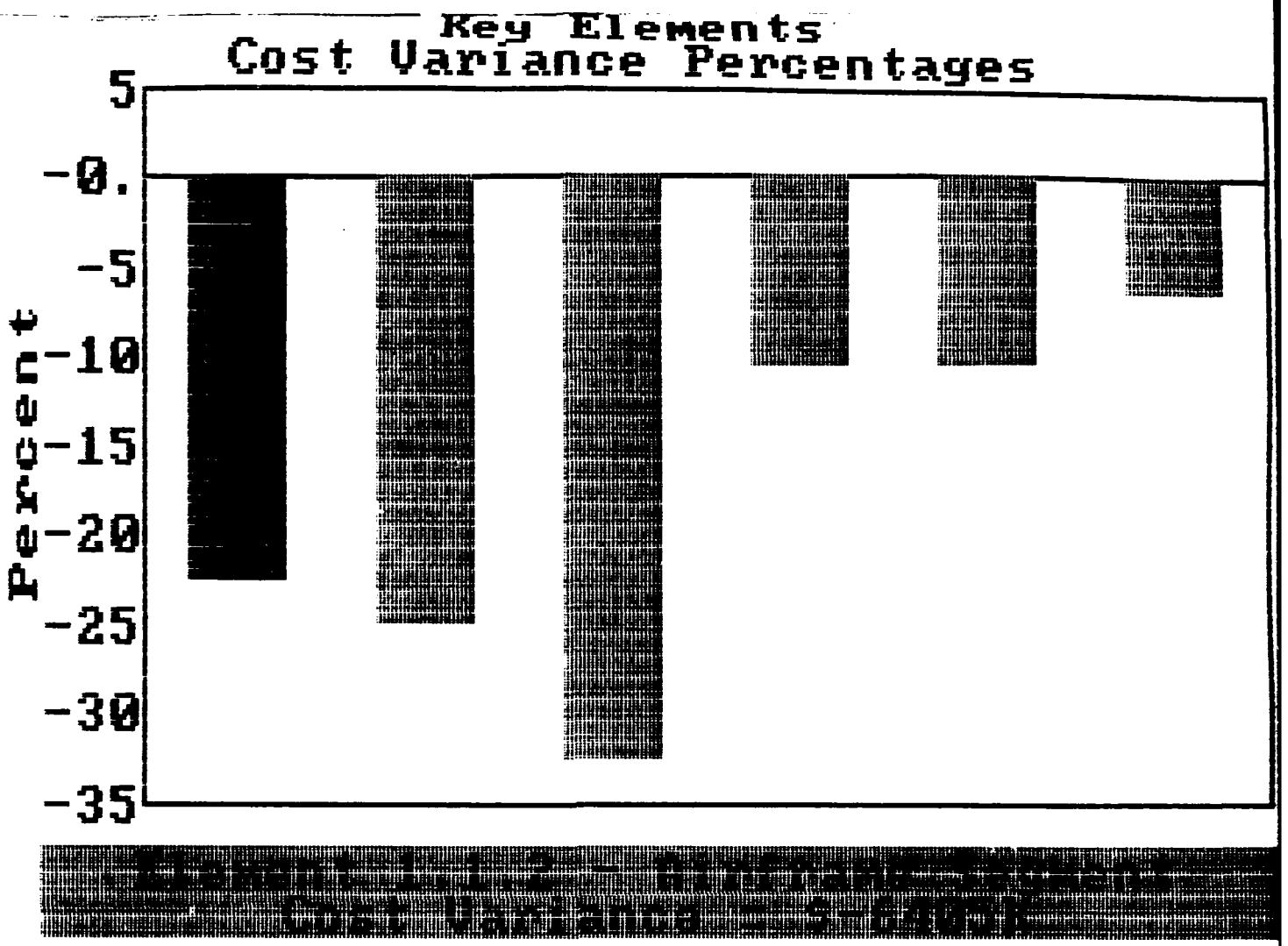
BUDGETED COST FOR WORK PERFORMED

The heart of a performance measurement system is the ability to determine work accomplished. It is probably one of the most difficult aspects for most con-

Cost Performance Indicies
WBS 1. LRP



F2 Status F3 Explain
F4 Elements F5 Overview F10 Exit



1 Use Space Bar and RETURN to Select

Status of Element 1.1.2 - Airframe Segment

This element represents 13.32 percent of the total contract.

** COST **

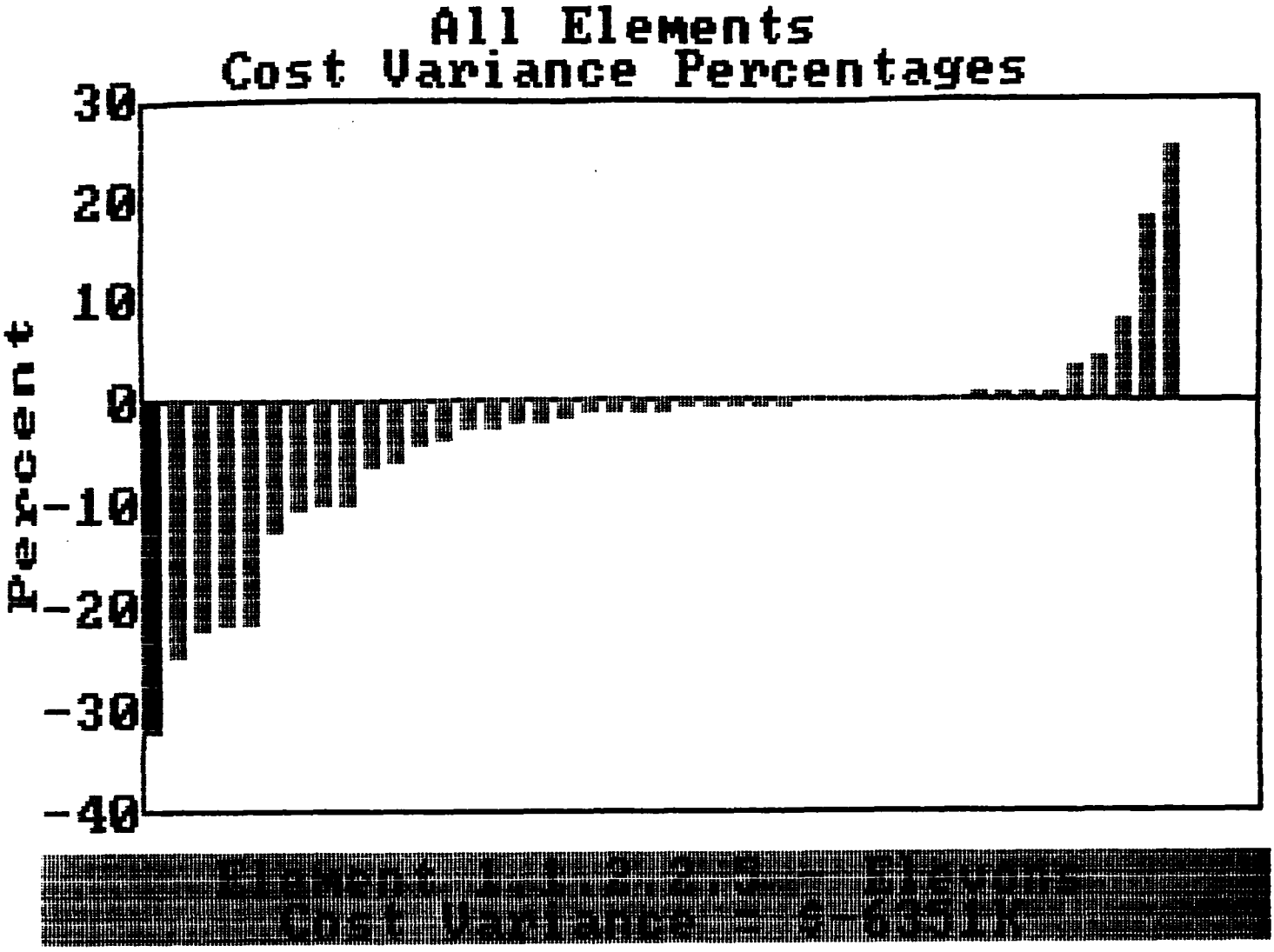
Monthly actuals are running at $3510K. This effort has an unfavorable cost variance of 23 percent. For what it's worth, overall performance is holding relatively steady.

** SCHEDULE **

The contractor says this effort is about 51 percent complete. Work in process is behind schedule.

** PROJECTED **

The contractor's estimate at completion is overly optimistic based on performance to date.



1 Use Space Bar and RETURN to Select

Status of Element 1.1.2.2.5 - Elevons

This element represents 5.79 percent of the total contract.

** COST **	** SCHEDULE **
Monthly actuals are running at $2538K. There has been a dramatic decrease in the rate of expenditures recently. This effort has an unfavorable cost variance of 33 percent. Performance is not good! Infact, problems seem to be continuing.	The contractor says this effort is about 81 percent complete. Work in process is behind schedule.

** PROJECTED **

The contractor's estimate at completion is overly optimistic based on performance to date.

[Next_Element] Cum_Performance Overview Explain Quit

Status of Element 1.1.2.2.5 - Elevons

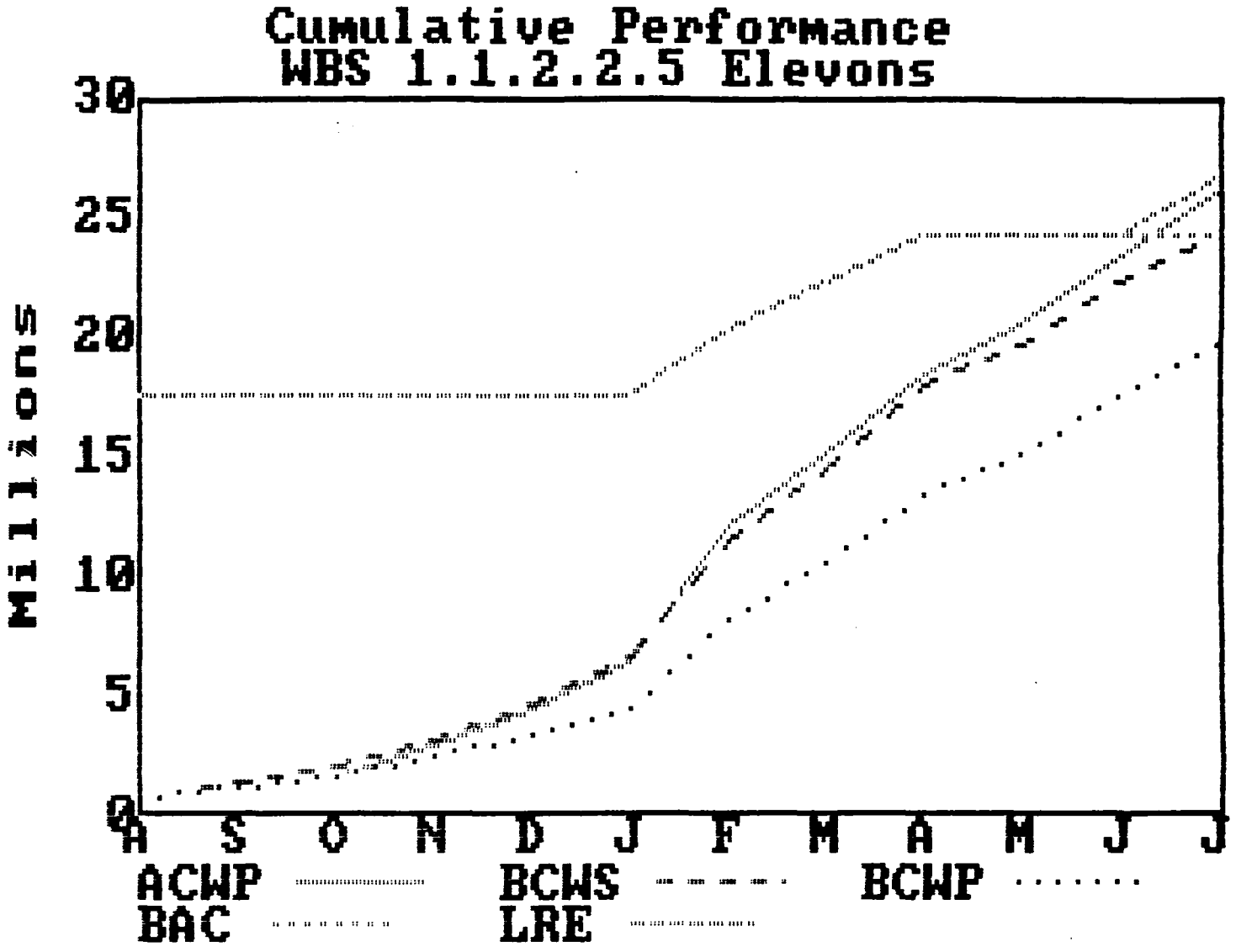
This element represents 5.79 percent of the total contract.

** COST **	** SCHEDULE **
Monthly actuals are running at $2538K. There has been a dramatic decrease in the rate of expenditures recently. This effort has an unfavorable cost variance of 33 percent. Performance is not good! Infact, problems seem to be continuing.	The contractor says this effort is about 81 percent complete. Work in process is behind schedule.

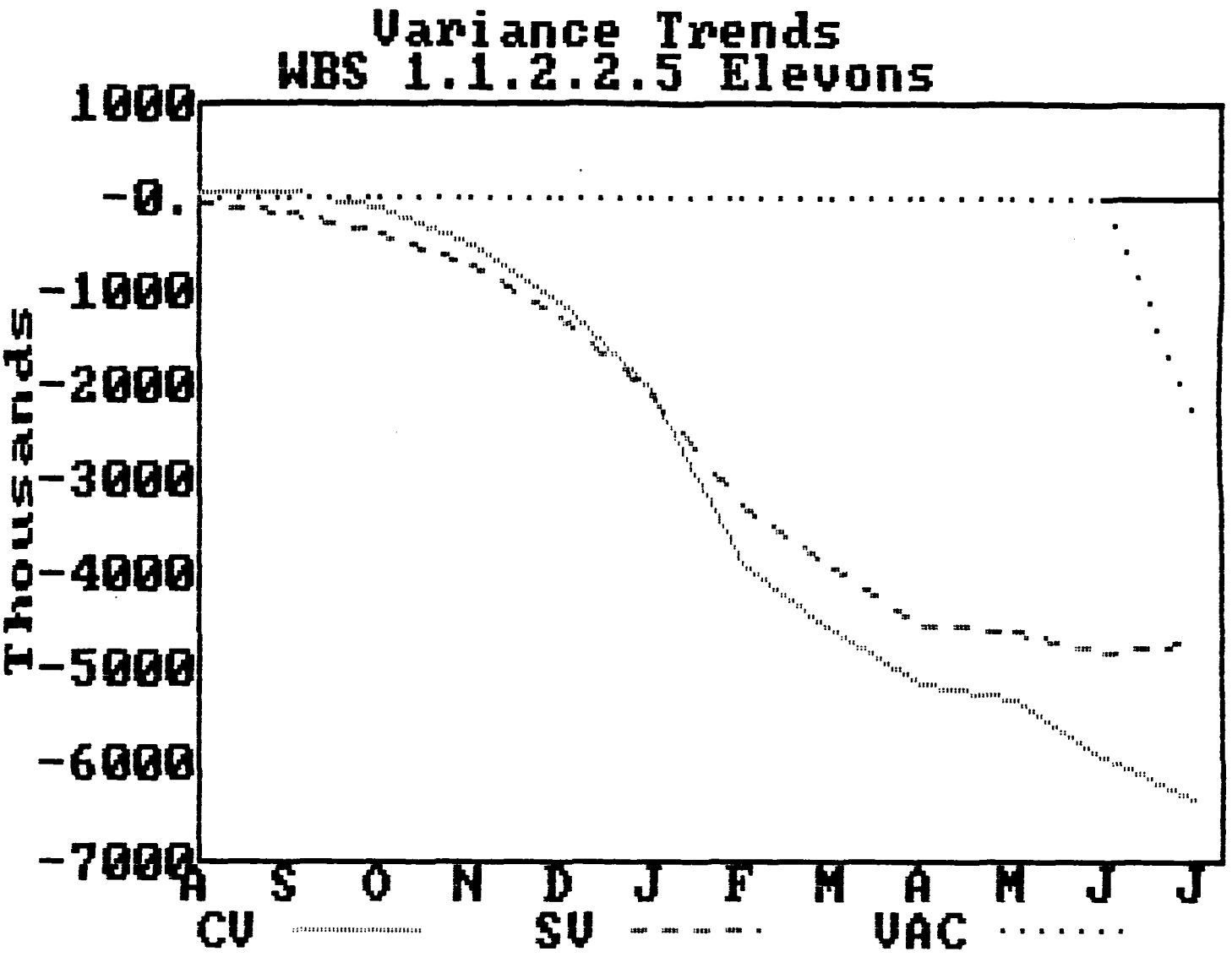
** PROJECTED **

The contractor's estimate at completion is overly optimistic based on performance to date.

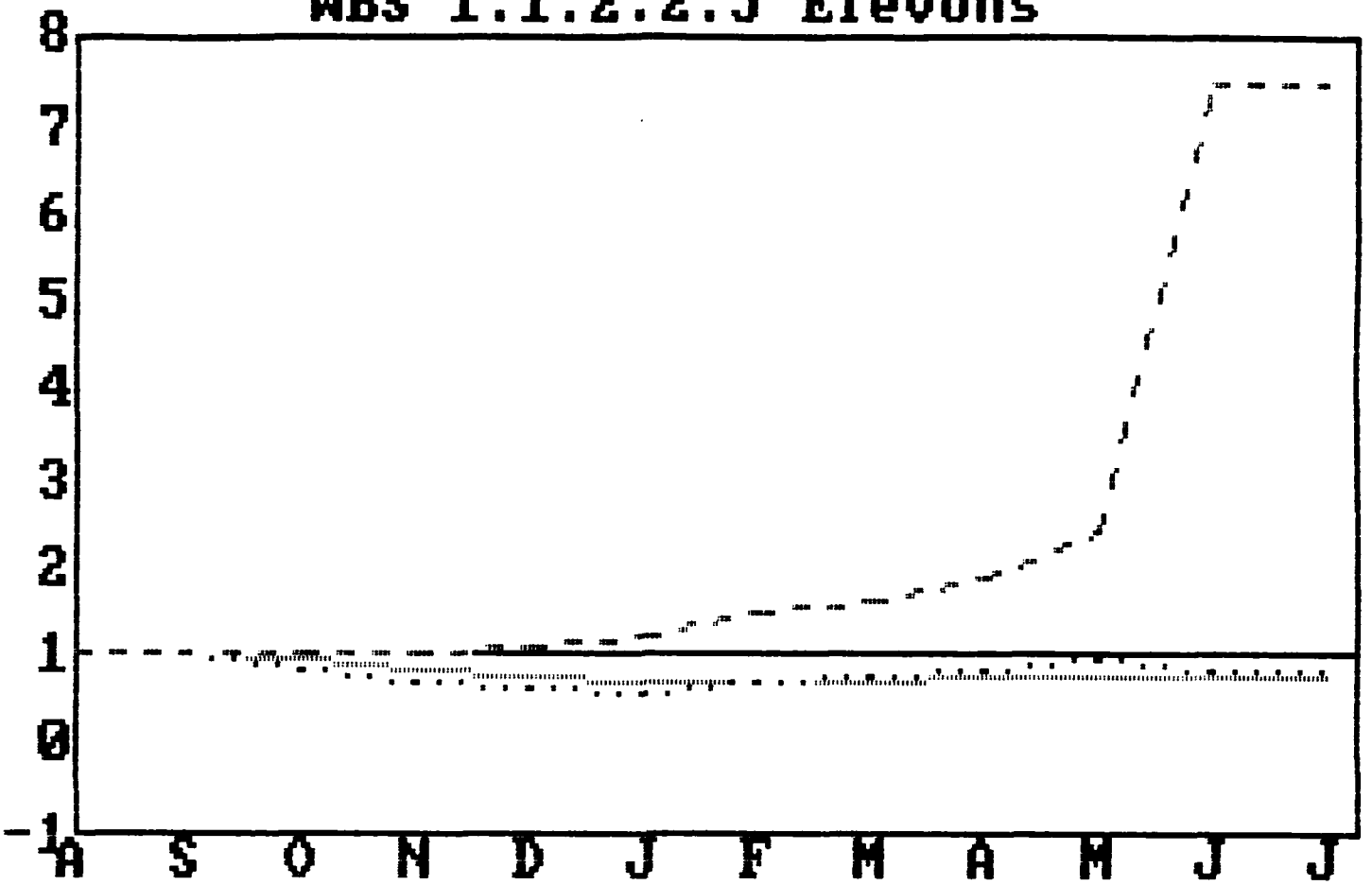
[Next_Key_Element] Cum_Performance Overview Explain Quit



[Variance_Trends] Status Explain
Zoom Next_Element Overview Quit


Variance Trends
WBS 1.1.2.2.5 Elevons
1000
-0.
-1000
-2000
-3000
-4000
-5000
-6000
-7000
Thousands
A S O N D J F M A M J J
CV
SV
VAC
Indicies
Status
Explain
Next_Element
Overview
Quit

Cost Performance Indicies
WBS 1.1.2.2.5 Elevons



[EAC's] Status Explain
Next_Element Overview Quit

INDICIES GRAPH

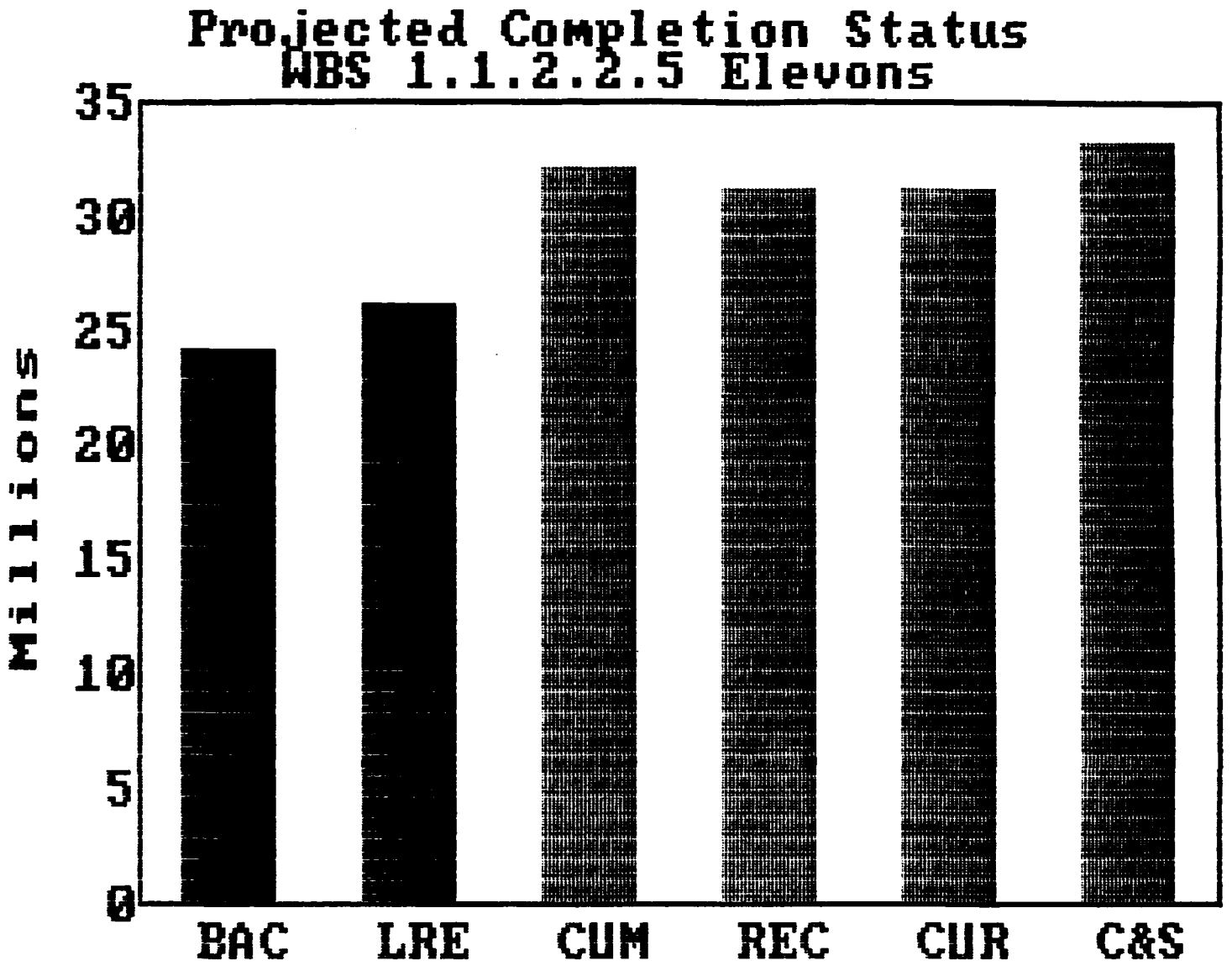
The indicies graph is a way of portraying cost performance that relates cumulative, current, and projected performance together.

The solid red line represents the cumulative CPI. This line shows the historical track of performance based on a "par" value. The line will normally flatted out at a relatively stable performance level.

The dotted blue line represents the current CPI. This is the most recent period performance, so there is a tendency for it to fluctuate quite regularly. The important thing to note, is whether current performance is below cumulative performance.

The dash yellow line represents the contractor's projected performance. It should be reasonably close to the past performance to be credible. If it is not, the contractor's EAC is probably wrong.

[RETURN] PREVIOUS_SCREEN HELP
CPI TCPI



[Next_Element] Status Explain Quit

AT COMPLETION PROJECTIONS

This graphic displays two contractor provided pieces of information and four CAPPs developed pieces of information. The contractor data are the BAC and the LRE, and the CAPPs data are the four EAC values on the right side of the graph.

This display provides you an immediate comparison of the budget for an element with the contractor's latest revised estimate for that element with four independently developed estimates at completion based on performance data. Hopefully, all six values are about equal. If not, then the last five should be. Where there are major discrepancies between the contractor's LRE and the four EAC's, and explanation is in order.

[RETURN] PREVIOUS_SCREEN HELP
Techniques BAC LRE

TECHNIQUES

There are many ways to project future performance, none of which have been proven exactly correct, yet some techniques seem to have almost a cultist following. CAPPs make no attempt to recommend a single approach, in fact, four different techniques are included.

CUM - Based on cumulative cost performance. This is the "standard" EAC technique.

REC - Based on recent cost history. Recent defined as the last three months. This method removes most of the fluctuation typical in the CUR method.

CUR - Based on current cost performance. Extrapolates the latest performance trends over the remaining work.

C&S - Based on a combination of the cumulative cost and schedule performance to date. Adding schedule assessment is a nice touch. It makes this method very popular in some circles.

[RETURN] PREVIOUS_SCREEN HELP
LRE definitions

LATEST REVISED ESTIMATE AT COMPLETION

The contractor's latest revised estimate at completion consists of the actual cost to date plus the latest estimate of cost for the remaining work. The estimate should be developed by those closely associated with the work who are well informed regarding work performance and problems, future resource costs, and furure requirements.

The contractor should prepare the estimate in a consistant manner from period to period with appropriate consderation given to such factors as performance to date, known and anticipated problems, work-arounds, economic escalation, and anticipated business volume.

The estimate should be reviewed monthly and revised as required to provide the best possible estimate of final cost.

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DEFINITIONS

The following elements are used to generate a variety of information perspectives useful for monitoring contract status and for determining areas requiring corrective action.

BCWS: Budgeted Cost for Work Scheduled

Time-phased allocation of goal oriented resources based on scheduled increments of work.

BCWP: Budgeted Cost for Work Performed

Time-phased allocation of goal oriented resources associated with completed increments of work.

ACWP: Actual Cost of Work Performed

Actual resources consumed to accomplish completed increments of work.

BAC: Budget at Completion

Pre-established goal or objective expressed as a budget for the accomplishment of a specific increment of work.

LRE (or EAC): Latest Revised Estimate at Completion

Current estimate of all resources required to accomplish a specified increment of work.

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BCWS BCWP ACWP BAC LRE

BUDGETED COST FOR WORK SCHEDULED

This data element is developed during the planning stages of an effort. It is created from the natural accumulation of resources (labor, material, etc.) which are associated with scheduled increments of work -- normally milestones or small tasks designed for this purpose.

Resource values used for BCWS are constrained by the pre-established objectives identified for the particular segment of work being planned. This means that there is a significant difference between BCWS and what is commonly called a spend plan -- which has no such constraint. In fact, BCWS is often refered to as a "work plan" to distinguish it from a "spend plan". Take note, because it is absolutely imperative to recognize this distinction to effectively interpret the performance information used in this module.

The summation of BCWS for all of the increments of work for all of the planned time periods exactly equals the BAC. Never any more and never any less!!

BCWS is the PLANNED VALUE for the PLANNED WORK

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BCWP ACWP BAC LRE

1. Sudden changes in the direction of either of the lines,

2. Unfavorable trends (downward) in the cost variance line, or

3. Early unfavorable schedule variance trends.

BUDGETED COST FOR WORK PERFORMED

The heart of a performance measurement system is the ability to determine work accomplished. It is probably one of the most difficult aspects for most contractors, yet it is probably one of the most useful if properly determined. Accurately reported, work accomplishment provides a common link between schedule and cost status. It overcomes that persistent problem of assuming that because actual costs match planned expenditures everything is okay.

BCWP is the term that is used for work accomplished, but it is also commonly known as earned value because the "value" associated with a particular task is "earned" when the task is completed. The terminology is unimportant; what is important is that the BCWP be as accurate and as timely a measure as possible of the completion status of a particular effort. If a task is fifty percent complete, for example, then BCWP should be fifty percent of the total budget (value) for that task.

This isn't a trite concept, and many contractors argue that BCWP is not worth its cost. The fact is, that BCWP does not need to be expensive; and it certainly provides useful information available nowhere else!

BCWP is the PLANNED VALUE for the COMPLETED WORK

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ACWP BAC LRE BCWS

ACTUAL COST OF WORK PERFORMED

This element represents those direct and indirect costs identified specifically to a particular contractual effort. Although they need not be exactly the same, they should reconcile with the contractor's incurred-cost ledgers which are regularly audited by the Government. The ACWP must relate to the accomplishment of contract work (BCWP) and, to be usable, must be reported in the same time period.

This element rarely give anyone a problem understanding, but it is a real killer when it becomes twice as large as it was intended.

ACWP is the ACTUAL COST for the COMPLETED WORK

[RETURN] PREVIOUS_SCREEN HELP
BAC LRE BCWS BCWP

BUDGET AT COMPLETION

The BAC is the total budget (value) associated with a particular element of

BUDGET AT COMPLETION

The BAC is the total budget (value) associated with a particular element of the contract. The sum of all such budgets plus any undistributed budgets and any remaining management reserve should equal the negotiated contract cost plus the estimated cost for authorized, undefinitized work. If this relationship does not exist, the data does not provide true "contract" status.

This does not mean that the BAC is cast in concrete. These budgets change during the life of a contract to reflect contract changes, internal replanning, and applications of management reserve.

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definitions LRE

LATEST REVISED ESTIMATE AT COMPLETION

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definitions

OVERVIEW

Contract: Test Data Base

Data as of: JUL84

There are:

12 Level 2 WBS Elements
7 Level 3 WBS Elements
2 Level 4 WBS Elements
9 Level 5 WBS Elements

There are also 12 Functional Elements

The contract began in AUG83 and is currently projected to finish in JUN86. This means that the contract is about 32 percent complete, based on time. Performance data indicates that the contract is about 40 percent complete. The contract is projected to overrun.

Use the space bar to select an option from
the menu at the bottom of the screen
Then press RETURN.

[Contract_Status] Key_Elements All_Elements Update Explain Quit

END

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